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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/783,472	BASHAN ET AL.	
	Examiner	Art Unit	
	Khuong Tran	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Israel on 02/20/2003. It is noted, however, that applicant has not filed a certified copy of the 154560 application as required by 35 U.S.C. 119(b).

Specification

1. The disclosure is objected to because of the following informalities:

- From paragraph [0009], line 8 'him' should be changed to –it--.
- From paragraph [00023], line 1 'then' should be changed to –than--.
- From paragraph [00031], line 5 'are' should be deleted.
- From paragraph [00035], 'is' should be removed from the phrase "may be is" on line 3 and --be-- should be inserted after 'to' in the phrase "to sent" on line 5.
- From [00057], line 3 the term 'OLY' is a typographical error.
- From [00068], line 2 the term 'ans' is a typographical error.
- From [00070], the classifier is labeled with a wrong part number. It should be 13 instead of 11.
- From [00078], part numbers 40 and 46 are being used twice but refer to different entities in the drawing. See also Drawings below.

- From [00079], line 2 the part "downstream transmitter" is labeled with a wrong part number, 46 should be used instead of 48.
- From [00080], line 4 the part "grant allocator" is labeled with a wrong part number, 49 should be used instead of 48.
- From [00083], the terms 'transmitted' on line 3 and 'timslots' on line 5 are typographical errors.
- From [00095] and [00096], references to the wrong figure in the drawing are mentioned.

These informalities inhibit the specification from its meaningful disclosure. Appropriate corrections are required.

Drawings

2. The drawing from Figure 2 is objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "40" and "46" have been used to designate both "Downstream Data Interface" and "GQ1" and "Downstream Transmitter" and "GQ3", respectively. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawing from Figure 1B is objected to under 37 CFR 1.83(a) because it fails to show reference character "28" as described in the specification on page 14, paragraph [00067] line 7. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 17, 21, 25, and 37 are objected to because of the following informalities:

- From claim 17, the word --from-- should be inserted after the phrase "data being received"
- From claim 21, the word 'clam' is misused in this context. Appropriate correction is required.
- From claim 23, the word 'an' before the phrase "group of fixed sized cells" should be changed to 'a'.
- From claim 25, the phrase "wherein the claim 24" is redundant.
- From claim 37, --the step of—should be inserted after 'comprising'.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 7-13, 24-31, 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Ghaibeh et al. (US Patent No. 5,978,374).

Regarding claim 1, Ghaibeh et al. disclose in **figure 1** of a communication system comprising:

An optical communication network **[20, figure 1]** interconnecting a headend **[22, Figure 1]** and a plurality of network units **[26, figure 1]**; wherein the headend has a media access controller **[28, figure 1]** for issuing data grants and grouping information requests **[column 2, lines 21-31]**; wherein a data grant being issued at least partially in response to previously received grouping information **[column 4, lines 40-55]**; and

wherein at least some network units out of the plurality of network units are operable to:

receive data to be transmitted to the headend **[column 2, lines 62-67]**.;

transmit grouping information associated with the received data **[column 4, lines 56-61]**.; and transmit data to the headend in response to data grants issued by the media access controller **[column 2, lines 39-42]**.

Regarding claim 2, Ghaibeh et al. illustrate the operation for downstreaming data in **figure 2**, where the transmission originates from the headend **22** in successive (i.e., serially transmitted) downstream data frames **48** **[column 4, lines 40-42]**. Subsequently, in **figure 3**, it is also noted that each downstream framing slot **60** includes a one byte MAC overhead permit field **50**; a twenty-eight bit NU physical ID field **62** used to identify specific NUs by their unique serial number **[column 5, lines 11-18]**.

Regarding claim 3 and 4, Ghaibeh et al. illustrate an arbitration scheme in **figure 11** using a permit selector and spacing processor **250** from **figure 10** that

resides within the headend media access controller (HEMAC). The arbitration scheme, as shown in **figure 11** consists of a selector circuit **251** that is capable of arbitrating between requests based on the different service type associated with its respective bandwidth manager **[column 10, lines 47-51]**.

Regarding claim 7, Ghaibeh et al mention that the data transmission is processed in successive downstream data frames **[column 4, lines 40-42]**. The prior art also teaches that the headend media access controller (HEMAC) is capable of transporting various digital data streams between the headend and the respective NUs **[column 4, lines 3-6]**.

Regarding claims 8 and 9, Ghaibeh et al specify each frame comprises a grouping information request **[column 4, lines 50-55]** and a plurality of fixed length slots **[column 4, lines 44-49]**.

Regarding claim 10, Ghaibeh et al teach the grouping information **[132, figure 6]** comprises grouping information units **[136, figure 6, 6A]** that represents a parameter of a group of data cells **[146-158, figure 6A]** that are stored in a queue within a network unit **[26, figure 6], [column 6, lines 60-67 and column 7, lines 1-7]**.

Regarding claim 11, Ghaibeh et al disclose a grouping information unit **[136, figure 6A]** wherein each group of data cells **[146-158, figure 6A]** comprises relevant payload and overhead signals **[column 6, lines 60-67]**.

Regarding claim 12, Ghaibeh et al disclose a grouping information unit **[136, figure 6A]** that reflects the length of a relevant payload **[149, figure 6A]**.

Regarding claim 13, Ghaibeh et al disclose the capability of the headend MAC to periodically send a block polling permit **[160, figure 7]**. It is further noted that block polling permit is especially advantageous in heavy network traffic conditions because it gives the network units the opportunity to update the headend MAC with information regarding a critical service priority queue. Thus the headend MAC is able to determine the grouping information based on the queues upstreamed from the NUs **[column 7, lines 42-52]**.

Regarding claim 24, Ghaibeh et al disclose the capability of the headend media access controller to issue data grants in response to at least one arbitration schemes **[column 11, 28-39]**.

Regarding claim 25, Ghaibeh et al disclose the received data that originate from the network units consist ATM payload cell in the payload portion of the upstream slot, as well as upstream request information, which contains a status count of the number of ATM cells awaiting upstream transmission, divided into respective service priority types **[column 2, lines 62-67]**.

Regarding claim 26, Ghaibeh et al disclose in **figure 11** that permits for different network units 26 of the same service priority type are allocated on a "round robin" basis by selectors 259, 263, and 271, respectively. In this manner, each NU 26 having at least one ATM cell in a respective VBR, ABR or CBR service type is given an equal allocation of the available upstream bandwidth for that respective service priority **[column 10, lines 60-67 and column 11, lines 1-12]**.

Regarding claim 27, Ghaibeh et al disclose that the headend MAC is capable of issuing a block polling permit to a selected group of NUs, which in turn, updates the headend with information in the service priority queues from the NUs. Block polling is advantageous in heavy network traffic conditions in that it insures all NUs will have at least some opportunity to update the HEMAC so that the HEMAC can reserve a portion of the available upstream bandwidth exclusively for one or more specifically targeted NUs **[column 7, lines 42-52]**. In addition, the HEMAC allocates upstream bandwidth permits to respective NUs based on a selected set of service types and transmission priorities, wherein respective permits specify which ATM service type is to be transmitted **[column 2, lines 51-55]**.

Regarding claim 28, Ghaibeh et al teach an optical network with a headend connecting a plurality of network units in **figure 1**. The headend consists of a media access controller that is coupled to a receiver **[figure 10, 232]** for receiving grouping information from the plurality of network units, where in grouping information reflect at least one parameter of fixed sized cell group to be upstream transmitted over the shared upstream channel **[figures 7, 7A]**, wherein the media access controller comprising:

At least one arbitration unit **[figure 10, 250]**, coupled between the receiver **[figure 10, 232]** and grant allocator **[figure 10, 258]**, for arbitrating between requests to upstream transmit fixed sized cell groups **[column 11, lines 28-31]**, and

A grant allocator **[figure 10, 258]**, for selecting data grants authorizing an upstream transmission of a group of fixed sized cells in response to the arbitration **[column 11, 28-39]**.

Regarding claim 29, Ghaibeh et al disclose the received data that originate from the network units consist ATM payload cell in the payload portion of the upstream slot, as well as upstream request information, which contains a status count of the number of ATM cells awaiting upstream transmission, divided into respective service priority types **[column 2, lines 62-67]**. It is further noted in **figure 11** by using "round robin" method, selectors 259, 263, and 271 can allocate upstream permits for different NUs of the same service priority type **[column 10, lines 60-64]**.

Regarding claim 30, Ghaibeh et al disclose in **figure 11** that permits for different network units 26 of the same service priority type are allocated on a "round robin" basis by selectors 259, 263, and 271, respectively. In this manner, each NU 26 having at least one ATM cell in a respective VBR, ABR or CBR service type is given an equal allocation of the available upstream bandwidth for that respective service priority **[column 10, lines 60-67 and column 11, lines 1-12]**.

Regarding claim 31, Ghaibeh et al disclose that the headend MAC is capable of issuing a block polling permit to a selected group of NUs, which in turn, updates the headend with information in the service priority queues from the NUs. Block polling is advantageous in heavy network traffic conditions in that it insures all NUs will have at least some opportunity to update the HEMAC so that

the HEMAC can reserve a portion of the available upstream bandwidth exclusively for one or more specifically targeted NUs **[column 7, lines 42-52]**. In addition, the HEMAC allocates upstream bandwidth permits to respective NUs based on a selected set of service types and transmission priorities, wherein respective permits specify which ATM service type is to be transmitted **[column 2, lines 51-55]**.

Regarding claim 34, Ghaibeh et al. teach an optical network with a headend connecting a plurality of network units in **figure 1**. The headend consists of a media access controller that is capable of allocating upstream bandwidth for the network units by sending out regular ATM upstream permits **[column 5, lines 55-61]**. Additionally the MAC can reserve bandwidth for the shared upstream channel by a predetermined basis by sending out a block polling permit to a group of network units. In response to the blocking permits, the selected network units send information to the upstream frame slot to update the headend MAC with information regarding the current status of their service priority queues. Thus allowing the MAC to issue data grants more effectively authorizing the identified network based on the previous information received from the polling permit **[column 7, lines 14-52]**.

Regarding claim 35, Ghaibeh et al disclose in the abstract that the invention is relating to a point to multipoint passive optical network (PON).

Regarding claim 36, Ghaibeh et al disclose in **figure 11** the use of a selector circuit 251 from the permit selector and spacing processor unit 250 to separate requests based on service types and network unit logical ID **[figure 10,**

column 10, lines 47-51]. Reference is made to **figure 10**, wherein Ghaibeh et al further teach the functions of the permit priority selector 258. In addition to feeding the permits from the VBR, ABR, and CBR permit queues 252, 254, and 256 to the downstream frame assembler 204, the permit priority selector sorts the permits by their priority. For instance, CBR permits from queue 256 are given top priority due to the very low CDV that must be maintained for these services, followed by VBR and AER permits from queues 252 and 254, with group polling and ranging permits from queue 137 typically given the lowest priority **[column 11, lines 28-39]**.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al. and further in view of Tomioka (US Patent 5,452,115).

Regarding claims 5 and 6, Ghaibeh et al. disclose that up to sixteen different service priority types may be identified in accordance with the transmission protocol methodology **[column 10, lines 12-18]**. Thus the use of provisioned bandwidth, guaranteed bandwidth, assured bandwidth and non-assured bandwidth is well known in the art. For example, Tomoika discloses an optical communication network capable of utilizing guaranteed bandwidth in

order to obtain high throughput in data transmission **[column 30, 40-43]**. Hence it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al. to include provisioned bandwidth, minimum latency, guaranteed bandwidth, assured bandwidth, non-assured bandwidth, minimum drop and minimum jitter as the possible choices for class of services as taught by Tomioka and those known in the art in order to prevent the whole communication system from going down in the event of a network controller failure **[column 30, lines 44-48].**

9. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al. and further in view of Quayle (US Patent 6,317,234).

Regarding claims 14-16, Ghaibeh et al. mention a method called block polling that is issued by the headend media access controller. The 'block polling' permit allows for a group of network units to respond with bandwidth requests and to update the headend with the current status of their service priority queues in the upstream bandwidth allocation **[column 7, lines 42-52]**. Thus the headend should be able to determine an amount of grouping information to send downstream to the respective network units based on the previous grouping information upstreamed from the network units as a result of the block polling permit. However, Ghaibeh et al. fail to teach such determination is responsive to data threshold (claim 14) and to an estimation of grouping information to be sent from the network unit (claim 15). Additionally, a limitation further defines data threshold as the maximal amount of data that can be transmitted from the network unit to the headend during a predefined time period (claim 16).

Quayle discloses in the claims of a communication network comprising a headend station linked to an optical network unit by means of an optical waveguide. The headend includes control means are responsive, on receipt of a request message transmitted by the optical network unit indicative of the quantity of data intended to be sent therefrom, to transmit to the optical network unit a polling message including an indication of the quantity of data that the optical network unit is permitted to send to the headend station. It is further disclosed that the optical network unit, in response to the block polling permit, transmits a quantity of data less than or equal to the permitted quantity (claim 14) indicated by said polling message **[column 11, lines 6-35]**.

Furthermore, Quayle teaches a method to predict the network unit's future upstream capacity requirements by having the control unit 12 of the optical line terminal 2 performing calculations based on the information already possessed by the previous transmitted data quantities in respect of a particular network unit [figure 1, column 9, lines 65-68, column 10, lines 1-24]. As a result, the control unit 12 of the OLT may estimate the permitted quantity of data to be specified in the next polling message to the respective ONUs from the previous grouping information obtained from the network units.

Therefore, a network unit can only upstream a quantity of data that is not to exceed the threshold value set by the headend media access controller's polling permit in the same MAC cycle of an upstream frame period (claim 16).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al to include the features of

determining grouping information by data threshold and by estimation methods performed from the headend media access controller. One is motivated as such in order to minimize the delay and variation in the delay to upstream data transmission for some or all of the services being transported by the passive optical network. Thus improve both the quality of individual services and the overall efficiency of the PON **[column 3, lines 36-45]**. Through optimizing an upstream capacity assignment schedule, the OLT may be able to maximize the rate of recovery from a period of heavy demand **[column 10, lines 40-44]**.

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al and further in view of Quayle.

Regarding claim 17, Ghaibeh et al disclose that it is apparent to those skilled in the art to acknowledge there is no requirement that any given NU necessary be equipped to handle all of the particular data services supported by the headend **[column 4, lines 31-35]**. Subsequently Quayle teaches of a method to perform calculations from the headend to predict future upstream permit allocation for a particular NU in order to facilitate better bandwidth utilization **[column 9, lines 65-67 column 10, lines 1-3 and 29-32]**.

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify the teaching of Ghaibeh et al to include the features of estimating grouping information relating to the data received from the network unit in headend media access controller as taught by Quayle. One is motivated as such in order to minimize the delay and variation in the delay to upstream data

transmission for some or all of the services being transported by the passive optical network **[column 3, lines 36-45]**.

11. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al and further in view of Munter (Pub No. 0075540).

Regarding claim 18, Ghaibeh et al disclose an input port **46** in the optical network unit in **Figure 1**. It is inherent that each packet will have variable length when received by the network unit. Ghaibeh et al also disclose a packet disassembler **206** that's capable of separates the framing slot information **60** and MAC overhead bytes **50**, and then evaluates the VPI and VCI fields in each of the ATM slots **[column 9, lines 7-13]**. Furthermore, ATM cells that originate from the headend should have some sort of parameters reflecting their payloads. Therefore, it would also be inherent for a packet disassembler to generate grouping information based on the packets being received. Even though, Ghaibeh et al teach the ATM cells that are intended for the respective NU are parsed into a data stream for further processing **[column 9, lines 13-15]**, it is unclear as to how these data are processed. Munter teaches an optical network implemented in a rotator architecture. The rotation is based on the ATM cells coming through the switch. The packets are segmented into fixed size cell, systematically delivered from the edge nodes to the buffers in a round robin manner **[paragraph 0074, lines 5-10]**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Ghaibeh et al to include the features of a rotator architecture to segment variable length data into fixed size cell as taught

by Munter. One is motivated as such in order to combine the simplicity of single-hop routing with virtually unlimited capacity growth, without the need of continuously introducing larger switches **[paragraph 0071, lines 1-4]**. The rotator architecture was designed for obtaining larger switches from lower capacity modules interconnected by fiber **[paragraph 0075 lines 1-3]**.

Regarding claim 19, Ghaibeh et al disclose the network units are capable of classifying the data according to their different service types based on the four bit permit type field **[figure 5, 110 and 120]** from the downstream data frame. In most cases, the permit type will provide for the upstream transmission of a specified service priority ATM cell, such as high priority continuous bit rate ("CBR") services **[column 5, lines 59-66]**.

Regarding claim 20, while Ghaibeh et al disclose the optical network that supports upstream and downstream transmissions of digital data in an ATM-based, point-to-multipoint broadband access network **[column 2, lines 2-6]**, they fail to further limit the digital data into Internet Protocol packet data. Those who know the art should be able to recognize IP data packets are variable in length. Moreover, as Munter indicated that optical networks may, for example, use standard Ethernet, Internet Protocol (IP), multi-protocol label switching packets which are not of a fixed size as the cells **[paragraph 0076, lines 1-6]**.

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al to include the features of Internet Protocol as one of the supported digital data types as taught by Munter.

One is motivated as such in order to assure the highest occupancy (load factor), for individual links so as to increase efficiency **[paragraph 0086, lines 7-13]**.

Regarding claim 21, Ghaibeh et al teach that these fixed size cells are Asynchronous Transfer Mode cells as indicated by the invention **[figure 4, column 5, lines 26-40]**.

12. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al, and further in view of Wright (US Patent No. 6,445,702).

Regarding claim 22, Ghaibeh et al teach the downstream data frames are made up of fixed size cells **[column 5, lines 11-40]**. However, Ghaibeh et al fail to include an assembly unit for grouping the fixed size cells into groups. Wright discloses an encoding algorithm to apply to each downlink frame. The method is provided for organizing a plurality of cells into a fixed size frame for transmission. It consists of determining an inner coding rate for a first set of data cells and forming a group of codewords by applying an outer code to the first set of data cells, such that the number of codewords being proportional to the inner coding rate **[column 1 lines 35-43]**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al to include an assembler unit for grouping the fixed size cells into group as taught by Wright. One is motivated as such in order to avoid complex processing in the transmission of downlink frames **[column 2, lines 66-67]**.

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al in view of Wright as applied to claim 22, and further in view of Lee et al (US Patent No 6,614,759).

Regarding claim 23, Ghaibeh et al disclose the feature of the network units that extracts the downstream framing slot and evaluates grouping information such as the VPI and VCI fields in each of the ATM slot as a verification process for receipt **[column 9, lines 7-14]**. Ghaibeh et al alone or in combination with Wright, however, fail to specifically include a grouping information generator to generate a representative of a parameter of a group of fixed size cell. Lee et al disclose an optical network unit function processing apparatus that consists of a Universal Test and Operations Physical Interface for ATM (UTOPIA) input part that reconstructs a header information by reading an ATM cell from the AAL1 processing part, an AAL5 subscriber and generates an upward connecting memory address where an information corresponding to the received ATM cell **[column 5, lines 30-37]**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al in view of Wright to include an ONU function processing apparatus as taught by Lee et al. One is motivated as such in order to protect the network from the cell delay and traffic due to statistical multiplexing which are the characteristics of ATM and from the malfunctions of the subscribers' equipments due to mistake or intention **[column 5, lines 50-54]**.

14. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al, and further in view of Terrell et al (Pub No. US 2003/021686).

Regarding claims 32 and 33, Ghaibeh et al disclose a way for the network units to upstream bandwidth allocations based on the different priority settings in their service type queues as a result of arbitration **[column 11, lines 28-46]**. However, they fail to teach about a grant allocator unit located at the headend facility that is operable to receive the upstreamed data from the arbitration unit and select them in response to a predefined priority between at least one arbitration unit. Each arbitration, as shown in **figure 10**, is associated with a priority type that may be CBR, VBR, or ABR. Terrell et al disclose a routing method in their invention that efficiently allocates bandwidth without completely stalling a low priority flow or unreasonably fragmenting a high priority flow **[paragraph 0029, lines 10-16]**. For instance, a method for routing frames may include arbitrating among queues on the basis of a grant pool for each of a plurality of service types or traffic classes **[paragraph 0164, lines 1-12]**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al to include a grant allocator unit as taught by Terrell et al. One is motivated as such in order to provide more efficient with more reliable networks for application service providers and storage service providers, thereby lowering the cost of operating and lowering the cost of these services to the consumer **[paragraph 0029, lines 5-10]**.

15. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghaibeh et al, and further in view of Hagersten et al (US Patent No. 5,987,549).

Regarding claim 37, Ghaibeh et al disclose arbitration methods performed at the network units in order to determine upstream bandwidth **[column 10, lines 60-67, column 11, lines 1-12]**. Ghaibeh et al, however, fail to disclose in detail process of the arbitration. Hagersten et al describe the implementation of a fast-slow arbitration method that is capable of switching modes. In fast mode, any board can drive the address bus immediately along with its request in the same clock cycle. When there is a collision, the mode switches to slow, and the winner is determined using round robin. Within the system, firmware preferably controls which arbitration method is used in a given system. In fast mode the request is present with the address, whereas in slow mode the winning request is present on the address bus two cycles before the address **[column 7, lines 9-38]**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ghaibeh et al to include the abovementioned arbitration method as taught by Hagersten et al. One is motivated as such in order to reduce arbitration latency that provides the simplicity of fixed prioritized arbitration **[column3, lines 29-33]**.

Conclusion

16. Any response to this Office Action should be **faxed** to (571) 273-8300 or **mailed** to:

Commissioner for Patents,
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-Delivered responses should be brought to
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401 Dulany Street
Alexandria, VA 22314

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khuong Tran, whose telephone number is (571) 270-3522. The examiner can normally be reached Mon-Fri from 7:30AM - 5:00PM.

18. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benny Q. Tieu, can be reached at (571) 272-7490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

19. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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